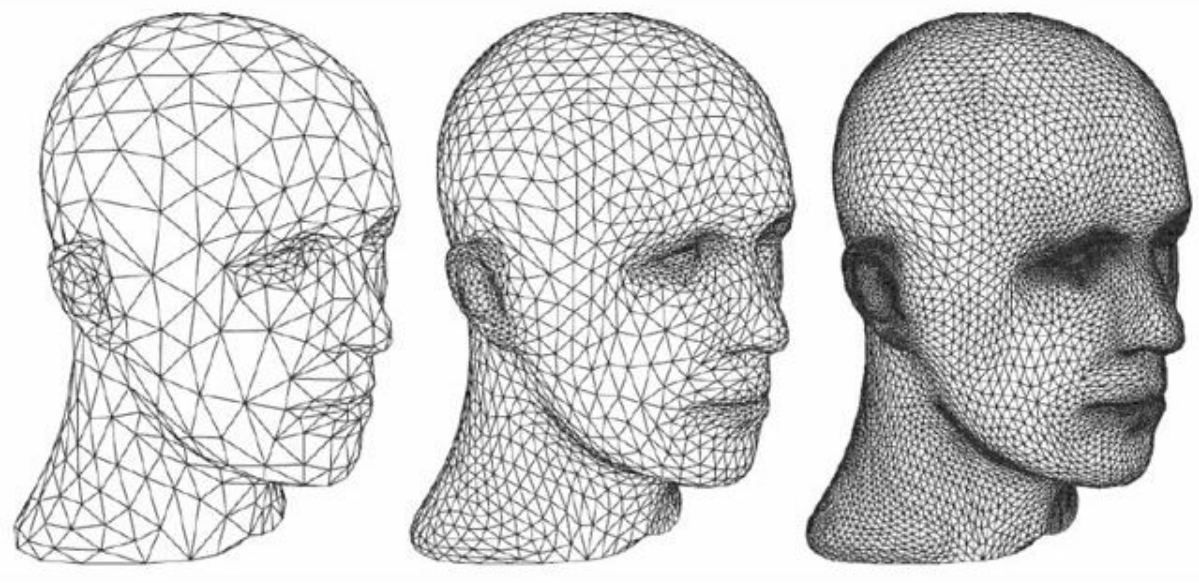
Faking Realism with Triangles

Shells, empty shells

In rasterizers, all objects that you see are empty shells.

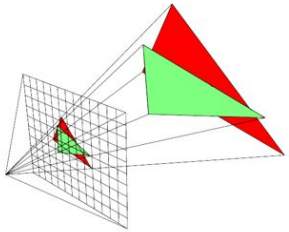
Everything is a shell.

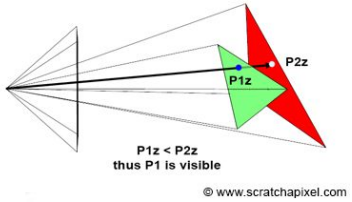
Triangles, endless triangles



All shells are made of triangles.

Paint, layers of paint

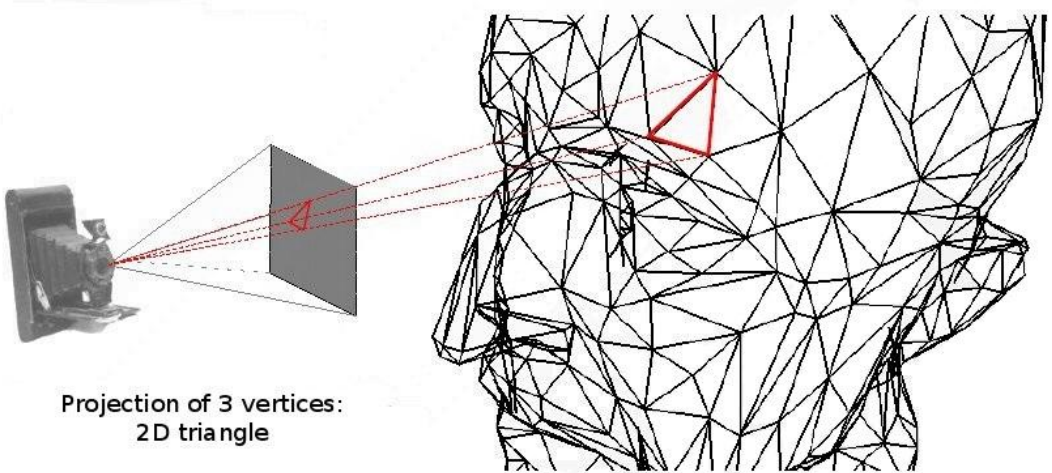




For each triangle

For each pixel

Does triangle cover pixel?



Realism, a lack of Realism

Rasterization could include shadows and reflections using dirty hacks.

However, something feels missing. It feels less real - maybe the characters just seem a little lifeless.

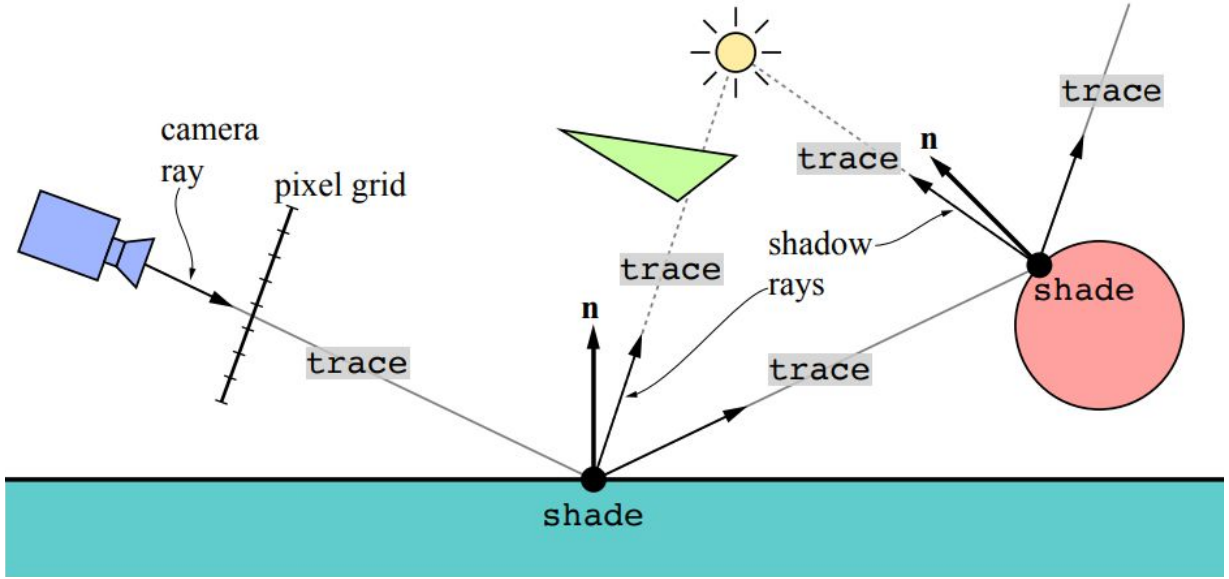
Maybe it is the light?

Rays, bunch of rays

For each pixel (ray)

For each triangle

Hit/No Hit?




GPU Board Power : 234 W
GPU1/MEM1 clock : 2115 MHz / 8000 MHz
GPU1 Temp : 46 °C / 49 °C
GPU1 MEM Temp : 58 °C / 53 °C / 46 °C
GPU1 PWR Temp : 44 °C / 38 °C / 49 °C / 51 °C / 33 °C
GPU Fan1 Tacho : 1291 RPM
GPU Fan2 Tacho : 1223 RPM
Memory Usage : 6364 MB
Framerate : 49 FPS

Illuminations, Global Illuminations

Ray traced Global Illuminations allows accurate/realistic world lighting.

Speed, different speed

Rasterization is typically faster than Ray tracing.

	Cube	Sphere	Teapot	Bunny	Car
					
Triangle count	12	120	1056	4967	13308
Ray tracing time (ms)	1.5	11.7	106.3	437.4	1274.6
Rasterization time (ms)	0.5	1.5	1.5	1.5	2.0

References

Akenine-Mller, T., Haines, E., & Hoffman, N. (2018). Real-Time Rendering, Fourth Edition (4th ed.). A. K. Peters, Ltd.

Chang, C.-F., Chen, K.-W., & Chuang, C.-C. (2015). Performance comparison of rasterization-based graphics pipeline and ray tracing on GPU shaders. 2015 IEEE International Conference on Digital Signal Processing (DSP), 120–123. https://doi.org/10.1109/ICDSP.2015.7251842

Graphics and Rendering. (n.d.). Retrieved December 7, 2021, from https://paroj.github.io/gltut/Basics/Intro%20Graphics%20and%20Rendering.html

Pharr, M., & Humphreys, G. (2010). Physically Based Rendering, Second Edition: From Theory To Implementation (2nd ed.). Morgan Kaufmann Publishers Inc.

Scratchapixel. (n.d.). Rasterization: a Practical Implementation. Scratchapixel. Retrieved December 7, 2021, from https://www.scratchapixel.com//lessons/3d-basic-rendering/rasterization-practical-implementation

Goals

- Speak a little faster.
- Explain things more clearly.